

REMARKS/ARGUMENTS

The examiner has requested that the applicants provide copies of three documents mentioned in the specification ("Hillman, et al.", "Pogue et al." and "WO 0137195). Copies of each of these documents are therefore being transmitted herewith.

Claims 7 and 8 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite. In particular, the examiner has found Claim 1, from which Claim 7 depends, to lack antecedent basis for the terms "the stored coordinates of the defined plane." This lack of antecedent basis arose due to a clerical error, and Claim 7 should properly depend from Claim 6. Claim 7 has therefore been amended to refer correctly to Claim 6, which provides proper antecedent basis for the referenced passage. Reconsideration of Claims 7 and 8 under this ground for rejection is respectfully requested.

Claims 1-4, 11-13, 15, 17 and 18 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application Publication 2002/0118280 ("Medlar"). In making this rejection, the examiner has stated that Medlar discloses all of the features of the rejected claims. However, close examination of the applicants' invention and the cited prior art reveal some marked differences between them.

Medlar discloses a positioning device for a diagnostic imaging system that allows a patient to be moved from an exterior position to a position within the diagnosis system. An image of the patient may also be used to select a "desired examination region" on a patient and the system is then used to move the patient so that the examination region is brought into a central region or some other optimum region of the imaging system. As shown in the figure, Medlar uses an overhead camera 4 to gather an image of the patient, and then moves the patient using a laterally movable patient bed 2 to position the patient relative to the imaging system. A second camera 8 may also be used for patient observation or for allowing "slices" to be selected for imaging purposes. Notably, however, the system of Medlar is concerned with the positioning of

a patient in two-dimensions, and the optical system used is for positioning of the patient, not for diagnostic imaging.

In contrast with Medlar, the present invention is directed to the positioning of a mammal specifically for optical diagnostic imaging. That is, the applicants are concerned not just with the two-dimensional positioning of a surface on which the subject resides, but with the positioning of the subject in three-dimensions so as to allow accurate optical diagnostic imaging. This is due to the requirements of diagnostic optical imaging with regard to the collection of light at the surface of the subject.

As is known in the art, optical imaging is a powerful tool for performing diagnostic examinations of living tissue. Involved in the process of optical imaging is the introduction of light into a selected region of tissue, and detection of light emanating therefrom. Various techniques are used to analyze the light that exits from the tissue and to make determinations regarding the structure and state of the tissue. However, proper analysis of the detected light requires that it is collected accurately and with a relatively low degree of signal loss. As such, collection of the light just at the surface of the tissue is extremely important. When using an optical collection system based on classical optics, this means ensuring that the focal point of the collection optics is right at the surface of the subject where the light exits. Thus, when the collection optics have a fixed focus, it is necessary to position the subject so that the surface of interest coincides substantially with the object plane of the collection optics. This requires accurate positioning along the imaging direction as well as in two dimensions perpendicular thereto.

Claim 1 of the present application recites a method for positioning a mammal or part thereof for optical imaging, and the claim has been amended to clarify that the optical imaging in question is *diagnostic* optical imaging. Claim 1 further recites obtaining a digital image of a surface of the mammal comprising a region of interest, and defining the region of interest and registering coordinates of the region of interest with an optical imaging system having collection optics components. In addition, the

claim includes the limitation of "positioning the mammal relative to an object plane of the collection optics" so as to image the region of interest. This limitation is directed to the important step of orienting the surface of the subject with the object plane of the collection optics. To clarify this feature of the claim, Claim 1 has been amended to state that the positioning of the mammal is in three dimensions relative to an object plane of the collection optics. The claim has further been amended to state that the positioning is based on said registered coordinates of said ROI "such as to locate the object plane at said surface of the mammal and image the ROI." Similarly, Claim 11 has been amended to include the limitation of "a positioning element for positioning the mammal in three dimensions relative to an object plane of the diagnostic imaging system so that said surface of the mammal coincides with said object plane for imaging of the ROI."

Although the prior art of Medlar discloses the movement of a patient in two dimensions relative to an imaging system, there is no mention of moving the patient in three dimensions. Moreover, there is no mention of a *diagnostic* optical imaging system nor of any collection optics that might be used in such a system, and there is certainly no suggestion in Medlar of locating the object plane of the collection optics at a surface of a subject for imaging. As these features are clearly recited in the applicants' Claim 1 and Claim 11, as amended, these claims are clearly unsuggested by the prior art of Medlar. Claims 2-4 depend ultimately from Claim 1, and Claims 12, 13, 15, 17 and 18 depend ultimately from Claim 11, and these claims are therefore equally unsuggested by Medlar. Reconsideration of Claims 1-4, 11-13, 15, 17 and 18 under this ground for rejection is therefore respectfully requested.

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,315,630 ("Sturm"). In making this rejection, the examiner has stated that Sturm discloses all of the features of the applicants' Claim 1. Sturm discloses a positioning device for precisely positioning a part of a human body. In particular, the device of Sturm is applicable to the treatment of brain tumors, which requires that a patient's head be held immobile in a predetermined position. Marks are placed on the body of the patient, and sensors are used to produce two-dimensional pictures of the

marks. Picture processing techniques are used to precisely define the position of the body part, and a controller generates error signals when there are any misalignments.

As with the Medlar reference, Sturm fails to suggest the use of diagnostic optical imaging, and certainly provides no suggestion optical imaging in which the collection optics of an optical imaging system have an object plane, and in which the subject is moved to a position in which the object plane is located at the surface of the subject in the region of interest. As this is clearly recited in Claim 1, as amended, reconsideration of Claim 1 under this ground for rejection is respectfully requested.

Claim 9 was rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,662,036 ("Cosman"). The examiner has stated that Cosman discloses all of the features of the invention of Claim 9, including the determining of a three-dimensional (3D) contour and registering coordinates of the 3D contour.

Cosman discloses a surgical positioning system that may be used to position a patient's body properly for surgical treatment. The system uses an optical beam or an x-ray beam to track the location of the patient and index markers on or near the patient. As noted by the examiner, the system may construct an image of the patient in three dimensions. After gathering information regarding the position of the patient, a surface on which the patient resides may be moved to align the patient's body as desired.

The Cosman reference is notable in that it allows for a three-dimensional locating of a patient lying on a surface. However, the reference does not mention diagnostic optical imaging, the field of the present invention, and it therefore provides no discussion of how to position a subject with regard to such a system. As such, Cosman provides no suggestion of collection optics used in diagnostic optical imaging, or the alignment of an object plane of such collection optics with a surface of the subject. Rather, the optical imaging used by Cosman is directed solely to observational optical imaging used for the positioning of the patient who thereafter undergoes a subsequent treatment.

In contrast with Cosman, the present invention is directed to the positioning of a mammal for diagnostic optical imaging. In the embodiment to which Claim 9 is directed, a three-dimensional contour of the mammal is obtained and used by the imaging system in generating the desired optical image properties for diagnostics. To clarify the field and scope of the invention of Claim 9, the claim has been amended to recite that the optical imaging system is a *diagnostic* optical imaging system. The claim has been further amended to state that the 3D contour is used in the positioning of the mammal such that "a surface of the mammal substantially coincides with the object plane of the collection optics." Nowhere in Cosman is there any suggestion of an optical diagnostic system, and there is certainly no suggestion whatsoever of a positioning system that locates a surface of a mammal so that it substantially coincides with the object plane of the collection optics for such a system. As such, reconsideration of Claim 9 under this ground for rejection is respectfully requested.

Claim 16 was rejected under 35 U.S.C. §103(a) as being obvious over Medlar. The examiner has stated that Medlar does not specifically disclose the use of a tray (or bed) having a physiological sensor to monitor physiological states in the mammal, but takes official notice that beds for patients having such sensors were known in the art. Without responding to the examiner's conclusions in this regard, it is noted that Claim 16 depends ultimately from Claim 11. Claim 11, as amended, is considered to be unsuggested by the Medlar reference for the reasons provided above and, therefore, Claim 16 is equally unsuggested by the cited prior art. As such, reconsideration of Claim 16 under this ground for rejection is respectfully requested.

Claim 14 was rejected under 35 U.S.C. §103(a) as being obvious over Medlar in view of U.S. Patent No. 5,894,615 ("Alexander"). The examiner has found that the Medlar reference does not disclose the use of a tray (or bed) that is heated. The Alexander reference was therefore cited as showing a bed pad that may be used to heat or cool a subject on a bed. Without commenting on the applicability of the Alexander reference in this regard, it is noted that the prior art combination of Medlar

and Alexander still fails to suggest the invention recited in the applicants' Claim 11, from which Claim 14 depends. That is, Medlar and Alexander together fail to provide any suggestion of a positioning system for diagnostic optical imaging in which a mammal is positioned so that a surface of the mammal being imaged substantially coincides with an object plane of the collection optics of the imaging system. Reconsideration of Claim 14 under this ground for rejection is therefore respectfully requested.

Claim 10 was rejected under 35 U.S.C. §103(a) as being obvious over Cosman in view of U.S. Patent No. 4,896,343 ("Saunders"). In making this rejection, the examiner has noted that Cosman fails to disclose the scanning of a region of interest of a mammal with a laser beam directed substantially perpendicularly onto the region of interest, and the simultaneous obtaining of an image of the beam at a surface of the mammal. The Saunders reference is therefore cited as allegedly disclosing a system for measuring 3D surface data of a patient in order to control dosage of radiation, in particular by imaging laser beams directed substantially parallel to a surface of a region of interest. Without commenting on the applicability of the Saunders reference in this regard, it is noted that Saunders is unrelated to the field of diagnostic optical imaging and therefore provides no suggestion of how a subject might be positioned when using such a system. Thus, the combination of Cosman and Saunders provides no suggestion of the invention of Claim 9 for the same reasons as provided above with regard to the Cosman reference taken alone. Since Claim 10 depends from Claim 9, Claim 10 is equally unsuggested by the cited prior art combination. As such, reconsideration of Claim 10 under this ground for rejection is respectfully requested.

The indication of the allowability of Claims 5 and 6 is acknowledged. However, as the independent claim from which these claims depend is considered to be allowable for the reasons provided above, Claims 5 and 6 have not been rewritten in independent form at this time.

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Several non-substantive amendments have been made herein for the purpose of clarification or the correction of minor clerical errors. Acceptance of these amendments is respectfully requested.

In light of the foregoing amendments and remarks, it is respectfully requested that all the claims be allowed such that the application may be passed to issue. If it is believed that a telephone conference would help expedite prosecution of the application, the examiner is invited to call the undersigned.

Respectfully submitted,

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Attachments